

CLAIMS

What is claimed is:

- 5 1. A fluid metering apparatus comprising: a pair of cylindrical housings, each of the housings providing: a fluid exchange port; a screw aligned longitudinally with the housing; a means for rotating, engaged with the screw for rotating the screw alternately in clockwise and counter-clockwise senses; a rod having, at one end thereof, a nut, engaged proximally with the screw, the screw penetrating into a hollow space within the
10 rod, the rod linearly translating along the screw in response to rotation thereof, the port positioned at a distal end of the rod wherein, translation of the rod toward and away from the port draws the fluid into and expels the fluid out of the housing respectively; the means for rotating enabled for rotating the screws of the housings in opposing directions such that the fluid is expelled from one of the housings while the other of the housing
15 draws the fluid in, in an alternating, push-pull arrangement; a fluid conduction means including a double-throw fluid switch, the switch enabled for directing the fluid to one of the housings and directing fluid from the other of the housings in a first position of the fluid switch, and enabled for directing the fluid to the other of the housings and directing fluid from the one of the housings in a second position of the fluid switch.
- 20 2. A fluid metering apparatus comprising: plural pairs of cylindrical housings, each of the housings providing: a fluid exchange port; a screw aligned longitudinally with the housing; a means for rotating, the rotating means engaged with the screw for rotating the screw alternately in clockwise and counter-clockwise senses; a rod having, at one end thereof, a nut engaged with the screw, the screw penetrating into a hollow space within
25 the rod, the rod linearly translating along the screw in response to rotation thereof, the port positioned at a distal end of the housing wherein, translation of the rod toward and away from the port draws the fluid into and expels the fluid out of the housing respectively; the means for rotating enabled for rotating the screws of each of the pairs of the housings in opposing directions such that the fluid is expelled from one of the

- 5 housings of each of the pairs of housings, while the other of the housings of each of the pairs of housings draws the fluid in, the drawing and expelling taking place in an alternating, push-pull cycle within each of the pairs of housings; and a means for fluid conduction including a double-throw fluid switch, the switch enabled for directing the fluid to one of the housings and directing fluid from the other of the housings in a first position of the fluid switch, and further enabled for directing the fluid to the other of the housings and directing fluid from the one of the housings in a second position of the fluid switch.
- 10 3. The fluid metering apparatus of claim 2 wherein the fluid conduction means enables mixing of the fluids from at least two of the plural pairs of cylindrical housings.
4. The fluid metering apparatus of claim 2 wherein the fluid metering rates of the plural pairs of cylindrical housings are not equal.
- 15 5. A fluid metering method comprising the steps of: providing a distal fluid exchange port in each of at least one pair of cylindrical housings, and in each of the at least one pair of housings: aligning a screw longitudinally with the housing; engaging a means for rotating with the screw; rotating the screw alternately in clockwise and counter-clockwise senses; engaging a nut on one end of a rod with the screw so that the screw is able to penetrate within a hollow space within the rod; drawing and expelling the fluid through the port with linear translating of the rod along the screw in response to rotation thereof, positioning a fluid conduction means relative to at least one of the plural pairs of housing, in a first state wherein the fluid is directed away from one of the housings and toward another of the housings in one-half of a metering cycle of the method; and in a second state wherein the fluid is directed toward the one of the housings and away from the another of the housings in a second-half of the metering cycle of the method.
- 20 6. The fluid metering method of claim 5 further comprising the step of mixing the fluids from at least two of the plural pairs of cylindrical housings.
- 25 7. The fluid metering method of claim 5 further comprising the step of adjusting different fluid metering rates for the plural pairs of cylindrical housings.